PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2006-105082
(43)Date of publication of application : 20.04.2006

(51)Int.Cl. *F01L 13/00 (2006.01)*
F01L 1/20 (2006.01)

(21)Application number : 2004-295777
(22)Date of filing : 08.10.2004

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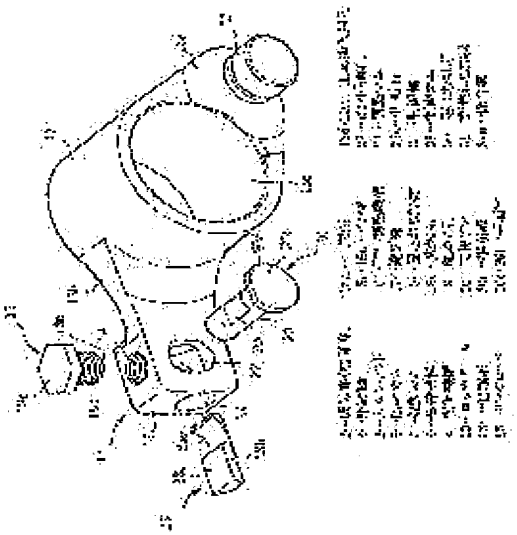
(54) VALVE GEAR FOR INTERNAL COMBUSTION ENGINE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a valve gear improving efficiency of adjustment work adjusting variation of lift of a suction valve of each cylinder at a time of device assembly.
SOLUTION: A support pin 20 rotatably connecting one end part of a link rod 15 is inserted through an elongated hole shape pin insertion hole 22 formed on a connecting part 17 provided on another end part 13b of a rocker arm 13 as one unit. A fixing female screw hole 19 perpendicularly crossing the pin insertion hole and oriented roughly upward in a vertical direction and a shim insertion hole 24 perpendicularly crossing the pin hole and the fixing female screw hole are formed in the connection part. A fixing screw member 18 abutting on the support pin from a perpendicular direction is treadedly attached to the female screw hole and a replaceable adjustment shim 23 gripped between the support pin and an inner circumference surface of the shim insertion through hole is inserted through and arranged in the shim insertion through hole.



LEGAL STATUS

[Date of request for examination] 14.03.2007
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]
The driving shaft by which the rotation drive was carried out and the drive eccentric cam was fixed to the periphery in one with an engine's crankshaft,
The rocking cam which carries out closing motion actuation of the engine valve,
The transfer device which changes into rocking movement rotation of the drive eccentric cam transmitted through said driving shaft, and is transmitted to said rocking cam,
The link member which constituted this a part of transfer device, and was prepared free [rocking] by using as the supporting point the support pin inserted in the pin hole which it has in an end side,
The lift adjustment device constituted so that adjustment SIMM might be pinched between this predetermined member and said support pin while fixing said support pin to the predetermined member by the holddown member inserted in from the hole for immobilization which it is prepared in the predetermined member to which said support pin is fixed, and points to which and carries out opening to the upper part side of the gravity direction,
The moving valve mechanism of the internal combustion engine characterized by preparation ******.
[Claim 2]
The driving shaft by which the rotation drive was carried out and the drive eccentric cam was fixed to the periphery in one with an engine's crankshaft,
The rocking cam which carries out closing motion actuation of the engine valve,
The transfer member which changes into rocking movement rotation of the drive eccentric cam transmitted through said driving shaft,
The rocker arm with which it rocked free [rocking] by having used the rocker shaft as the supporting point and which the rocking force was delivered from said transfer member,
The arm section which it is prepared in this rocker arm in one, and is rocked synchronizing with rocking movement of this rocker arm,
The link member which transmits rocking movement of said arm section to said rocking cam,
The support pin which is fixed to said arm section and serves as the rocking supporting point of said link member,
The SIMM insertion hole which was prepared in said arm section, respectively, was intersected perpendicularly and formed to the pin insertion hole and this pin insertion hole which can insert in said support pin, and was formed by intersecting perpendicularly with the hole for immobilization to which it pointed up mostly and said pin insertion hole, and the hole for immobilization of the gravity direction,
The holddown member which is inserted in said hole for immobilization and contacts said support pin from a rectangular cross,
Adjustment SIMM which is inserted in said SIMM insertion hole and pinched between said support pin and the inner skin of a SIMM insertion hole,
The moving valve mechanism of the internal combustion engine characterized by preparation ******.

[Claim 3]
The driving shaft by which the rotation drive was carried out and the drive eccentric cam was fixed to the periphery in one with an engine's crankshaft,
The rocking cam which carries out closing motion actuation of the engine valve,
The transfer device which changes into rocking movement rotation of the drive eccentric cam transmitted through said driving shaft, and is transmitted to said rocking cam,
The link member which constituted this a part of transfer device, and was prepared free [rocking] by using as the supporting point the support pin inserted in the pin hole which it has in an end side,
The adjusting-screw member which has the engagement section with which the tool which screws on the female screw hole for adjustment formed in the predetermined member to which said support pin is fixed, and gives turning effort engages,
The lockscrew member which is prepared free [screwing to the female screw hole for immobilization formed in said predetermined member at the upper part side of the gravity direction], and has the fitting section into which the tool which gives turning effort to an upper limit side fits, and can pinch said support pin between said adjusting-screw members,
The section for tool insertion which makes the point of said tool which penetration formation was continuously carried out, respectively in the shaft orientations of said lockscrew member, and the direction of a path of said support pin, attended the engagement section of said adjusting-screw member, and was inserted in from the upper part of said lockscrew member engage with the engagement section of said adjusting-screw member,
The moving valve mechanism of the internal combustion engine characterized by preparation ******.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
This invention relates to the moving valve mechanism of the internal combustion engine which can adjust the amount of valve lifts of an inlet valve at the time of the assembly of each configuration member.
[Background of the Invention]
[0002]
There are some which were indicated by the patent reference 1 of the following for which these people applied previously as this kind of a conventional moving valve mechanism.
[0003]
If an outline is explained, this moving valve mechanism will be what was applied to the inlet-valve side. While the drive cam the axial center carried out [the cam] eccentricity to the periphery of the driving shaft which rotates synchronizing with rotation of a crankshaft from the axial center of a driving shaft is prepared The turning effort of a drive cam is transmitted through the transfer device of the letter of a polymeria link, and a cam side ****s the top face of the valve lifter which it has in the upper limit section of an inlet valve, and it has the rocking cam which the spring force of a valve spring is resisted [cam] and carries out open actuation of the inlet valve.
[0004]
The rocker arm which said transfer device has been arranged above a rocking cam, and was supported by the control axis free [rocking], The link arm by which the circular ring-like end section fitted into the peripheral face of a drive cam, and the other end was connected with the end section of a rocker arm free [rotation] through the pin, The end section is connected with the other end of a rocker arm free [rotation] through a pin, and the other end consists of link rods connected with the cam-nose section of said rocking cam free [rotation] through the pin.
[0005]
Moreover, said control axis is supported free [rotation] by the bearing prepared in the upper limit section of the cylinder head, and the control cam to which the axial center carried out eccentricity only of the specified quantity from the axial center of a control axis is being fixed to the peripheral face.
[0006]
And when the rotation location of a control cam changes with the actuators which consist of an electric motor, a screw means of communication, etc. according to engine operational status through said control axis, the rocking supporting point of a rocker arm is changed, ******** to the valve-lifter top face of the cam side of a rocking cam is changed, and adjustable control of the amount of valve lifts of an inlet valve is carried out according to engine operational status.
[0007]
Moreover, many of each configuration members, such as said transfer device by the articulated link mechanism, are needed, such a moving valve mechanism originates in these manufacture errors, an error with a group, etc., it is easy to generate dispersion in the amount of valve lifts of

each inlet valve, it has become, and it is especially easy to generate dispersion in the amount of valve lifts between each gas column.
[0008]
So, in this conventional moving valve mechanism, after attaching and attaching to bearing in the condition of acting each configuration member, such as said transfer device, on a driving shaft or a control axis on the cylinder head, and having made the valve spring acting in the direction of a path, each pin is removed, a link rod is exchanged, that die length is changed, and the amount of valve lifts of each inlet valve is adjusted.
[Patent reference 1] JP,2001-123809,A
[Description of the Invention]
[Problem(s) to be Solved by the Invention]
[0009]
However, after once attaching this link rod to a rocker arm or a rocking cam and measuring the amount of valve lifts in order to adjust the die length of a link rod if it is in said conventional moving valve mechanism, again, a tool must be used, each pin must be removed from the side-face side of a link rod, another link rod with which die length differs must be chosen, and each pin must be again inserted and connected from a side-face side.
[0010]
Therefore, this lift tuning became complicated, since it must carry out by taking out and inserting each pin using a tool from the side-face side of the narrow link rod of a tooth space, the extraction-and-insertion activity became complicated, and decline in lift adjustment working capacity and the jump of cost are especially obliged.
[Means for Solving the Problem]
[0011]
This invention is what was thought out in view of the technical technical problem of said conventional good fluctuation valve gear. Invention according to claim 1 The driving shaft by which the rotation drive was carried out and the drive eccentric cam was fixed to the periphery in one with an engine's crankshaft, The transfer device which changes into rocking movement rotation of the rocking cam which carries out closing motion actuation of the engine valve, and the drive eccentric cam transmitted through said driving shaft, and is transmitted to said rocking cam, The link member which constituted this a part of transfer device, and was prepared free [rocking] by using as the supporting point the support pin inserted in the pin hole which it has in an end side, While fixing said support pin to a predetermined member by the holddown member inserted in from the hole for immobilization which it is prepared in the predetermined member to which said support pin is fixed, and points to which and carries out opening to the upper part side of the gravity direction It is characterized by having the lift adjustment device constituted so that adjustment SIMM might be pinched between this predetermined member and said support pin.
[0012]
According to this invention, since choose the optimal adjustment SIMM first, it arranges between a predetermined member and a support pin, said holddown member is inserted in the hole for immobilization from the upper part side of the gravity direction after that and said adjustment SIMM is only pinched between a predetermined member and a support pin in order to adjust the amount of valve lifts of an engine valve for attaching each configuration member in the case, the tuning of this amount of valve lifts becomes easy.
[0013]
The driving shaft with which the rotation drive of the invention according to claim 2 was carried out with an engine's crankshaft, and the drive eccentric cam was fixed to the periphery in one, The transfer member which changes into rocking movement rotation of the rocking cam which carries out closing motion actuation of the engine valve, and the drive eccentric cam transmitted through said driving shaft, The rocker arm with which it rocked free [rocking] by having used the rocker shaft as the supporting point and which the rocking force was delivered from said transfer member, The arm section which it is prepared in this rocker arm in one, and is rocked synchronizing with rocking movement of this rocker arm, The link member which transmits

rocking movement of said arm section to said rocking cam, and the support pin which is fixed to said arm section and serves as the rocking supporting point of said link member, It is prepared in said arm section, respectively, and is intersected perpendicularly and formed to the pin insertion hole and this pin insertion hole which can insert in said support pin. The SIMM insertion hole formed by intersecting perpendicularly with the hole for immobilization to which it pointed up mostly and said pin insertion hole, and the hole for immobilization of the gravity direction, It is inserted in said hole for immobilization, is inserted in said SIMM insertion hole with the holddown member which contacts said support pin from a rectangular cross, and is characterized by having the adjustment SIMM pinched between said support pin and the inner skin of a SIMM insertion hole.

[0014]

In according to this invention facing attaching each configuration member of a moving valve mechanism and adjusting the valve lift of an engine valve, while carrying out insertion arrangement of the adjustment SIMM which serves as criteria in the SIMM insertion hole of said arm section beforehand, it inserts a support pin in said pin insertion hole and pin hole of a link member first, for example.

[0015]

Then, a holddown member is inserted in from said hole for immobilization, said support pin is pressed to an adjustment SIMM side by this holddown member, and said adjustment SIMM is held in the pinching condition between the inner skin of a SIMM insertion hole, and a support pin.

[0016]

When measuring the amount of valve lifts of an engine valve and having not become a desired lift in this condition, other suitable adjustment SIMM with which thickness width of face differs is chosen, and it reattaches again. Although this adjusts in the desired amount of valve lifts, since this tuning can perform said holddown member from the upper part side of the gravity direction to the hole for immobilization, without removing all the lift adjustment devices, the tuning of this amount of valve lifts becomes easy.

[0017]

The driving shaft with which the rotation drive of the invention according to claim 3 was carried out with an engine's crankshaft, and the drive eccentric cam was fixed to the periphery in one, The transfer device which changes into rocking movement rotation of the rocking cam which carries out closing motion actuation of the engine valve, and the drive eccentric cam transmitted through said driving shaft, and is transmitted to said rocking cam, The link member which constituted this a part of transfer device, and was prepared free [rocking] by using as the supporting point the support pin inserted in the pin hole which it has in an end side, The adjusting-screw member which has the engagement section with which the tool which screws on the female screw hole for adjustment formed in the predetermined member to which said support pin is fixed, and gives turning effort engages, The lockscrew member which is prepared free [screwing to the female screw hole for immobilization formed in said predetermined member at the upper part side of the gravity direction], and has the fitting section into which the tool which gives turning effort to an upper limit side fits, and can pinch said support pin between said adjusting-screw members, Penetration formation is continuously carried out, respectively in the shaft orientations of said lockscrew member, and the direction of a path of said support pin. The engagement section of said adjusting-screw member is attended, and it is characterized by having the tool insertion section which makes the point of said tool inserted in from the upper part of said lockscrew member engage with the engagement section of said adjusting-screw member.

[0018]

According to this invention, in order to adjust the amount of valve lifts of an engine valve, where each configuration member is attached beforehand, respectively, the amount of valve lifts of an engine valve is measured.

[0019]

When the amount of valve lifts has shifted from the reference value at this time, change said lockscrew member into the condition of having loosened by the tool, and the point of this wrench

is made to engage with the engagement section of an adjusting-screw member, inserting tools, such as a wrench, from the upper part side of the tool insertion section of this lockscrew member, i.e., the gravity direction, and one of right and left is made to rotate this adjusting-screw member.
[0020]
Since the location of the support pin in the longitudinal direction of a link member is changed by this and the die length of a link member is substantially changed, the amount of valve lifts can be adjusted.
[0021]
If a lockscrew member is bound tight by predetermined tools, such as a spanner, after determining the amount of valve lifts, said support pin will be fixed to a pinching condition between this lockscrew member and an adjusting-screw member, and the tuning of the amount of valve lifts will be completed by this.
[0022]
Thus, in this invention, since the amount of valve lifts can be adjusted in the condition [having attached each configuration member not to mention the ability performing tuning of the amount of valve lifts from a gravity upper part side], this tuning becomes still easier.
[Best Mode of Carrying Out the Invention]
[0023]
Hereafter, each operation gestalt of the moving valve mechanism of the internal combustion engine concerning this invention is explained in full detail based on a drawing. With this operation gestalt, it has the adjustable device which applies to the Taki cylinder internal combustion engine's inlet-valve side, and is equipped with two inlet valves per 1 cylinder, and makes adjustable the amount of BAL lifts of an inlet valve according to engine operational status.
[0024]
The moving valve mechanism in this operation gestalt per [which was prepared in the cylinder head 1 free / sliding / through the valve guide outside drawing as shown in drawing 4 - drawing 7] 1 cylinder The inlet valves 2 and 2 of a pair, The driving shaft 3 of the shape of internal hollow arranged at the engine cross direction, and the cam shaft 4 which has been arranged for every gas column and supported by the peripheral face of said driving shaft 3 free [rotation on the same axle], It is prepared in the drive cam 5 fixed to the predetermined location of said driving shaft 3 in one, and the both ends of said cam shaft 4 at one. The rocking cams 7 and 7 of the pair which carries out open actuation of each inlet valves 2 and 2 in slide contact with the valve lifters 6 and 6 arranged in the upper limit section of each inlet valves 2 and 2, It was coordinated between the drive cam 5 and the rocking cams 7 and 7, and has the transfer device 8 in which the turning effort of the drive cam 5 is transmitted as rocking force (valve-opening force) of the rocking cams 7 and 7, and the controlling mechanism 9 which makes adjustable the actuated position of this transfer device 8.
[0025]
Said inlet valves 2 and 2 are energized in the closed direction with the valve springs 10 and 10 which were held in the upper limit circles of the cylinder head 1 and which were mostly attached elastically between the pars basilaris ossis occipitalis of a cylinder-like boa, and the spring retainer of the valve-stem upper limit section.
[0026]
Said driving shaft 3 is arranged along with an engine cross direction, and while being supported to revolve free [rotation] by the bearing outside drawing where both ends were established in the upper part of the cylinder head 1, turning effort is transmitted from an engine's crankshaft through the timing chain around which the driven sprocket wheel and this driven sprocket wheel outside drawing established in the end section were looped.
[0027]
Said cam shaft 4 is mostly formed in the shape of a cylinder in accordance with the shaft orientations of a driving shaft 3, and while penetration formation of the pivot hole supported by internal shaft orientations free [the rotation to the peripheral face of said driving shaft 3] is carried out, journal section 4a of the shape of a major-diameter cylinder formed in the mid gear

is supported to revolve free [rotation] by the cam shaft carrier outside drawing.
[0028]
While said drive cam 5 is formed almost disc-like, the tubed part for immobilization is prepared in that one flank at one and this tubed part is being fixed to the periphery of a driving shaft 3 in one through the pin 12 for immobilization in the predetermined location of the shaft orientations of a driving shaft 3, the peripheral face was formed in the cam profile of an eccentric circle, and the axial center Y has offset only the specified quantity in the direction of a path from the axial center X of a driving shaft 3.
[0029]
As for said each rocking cam 7, the cam side of the same configuration which contacts the top-face predetermined location of each valve lifter 6 on the inferior surface of tongue of the rocking cam 7 while the shape of a raindrop is presented mostly and a end face section side rocks the axial center X of said driving shaft 3 as a core through a cam shaft 4 is formed, respectively.
[0030]
Said transfer device 8 is equipped with the link rod 15 which is the link member which coordinates the link arm 14 which coordinates the rocker arm 13 arranged above a driving shaft 3, and end section 13a of this rocker arm 13 and the drive cam 5, and other end 13b of a rocker arm 13 and the cam-nose section of one rocking cam 7.
[0031]
Penetration formation of the support hole 13c is carried out from a longitudinal direction inside a central tubed base, and said rocker arm 13 is supported free [rocking] by the control cam 26 later mentioned through this support hole 13c, as shown also in drawing 1 - drawing 3 .
Moreover, as for end section 13a of a rocker arm 13, the lift adjustment device 16 in which it adjusts the amount of valve lifts of inlet valves 2 and 2 to other end 13b which is the arm section in connection with said link rod 15 at a tip side while the pin 27 protrudes at one is formed in the flank of a point.
[0032]
Penetration formation of the pin hole inserted in free [rotation of said pin 27] at protrusion edge 14b while fitting hole 14c which protruded on the peripheral face predetermined location of major diameter link arm [said / 14] circular ring section 14a and this circular ring section 14a, and which fits into the peripheral face of said drive cam 5 free [rotation] at the mid gear of circular ring section 14a is formed is carried out by projecting and having edge 14b.
[0033]
said link rod 15 -- press forming -- ****** -- it is mostly formed in the shape of a KO typeface, and in order that the inside may attain miniaturization, while bending formation is carried out mostly at the shape of ******, penetration formation of the pin holes 15c and 15d is carried out at the longitudinal direction, respectively to the parallel two-sheet tabular both ends 15a and 15b.
[0034]
Moreover, while other end 15b has coordinated the link rod 15 with the cam-nose section of the rocking cam 7 free [rotation] through the pin 21 inserted in 15d of said pin holes, it has coordinated end section 15a with other end 13b of a rocker arm 13 through the support pin 20 inserted in said pin hole 15c, and said lift adjustment device 16.
[0035]
said lift adjustment device 16 was formed in the point of other end 13b of a rocker arm 13 at one -- with the coordinated section 17 of the letter of a rectangle block mostly The female screw hole 19 for immobilization which it is formed in the interior from the top face of the gravity direction of this coordinated section 17, and the lockscrew member 18 which is a holddown member screws on from above, The pin insertion hole 22 in which penetration formation is carried out in the direction which intersects perpendicularly with said female screw hole 19 from the both-sides side of the coordinated section 17, and said support pin 20 is inserted, It was punctured in the direction which intersects perpendicularly with said female screw hole 19 and the pin insertion hole 22 from the front-face side of the coordinated section 17 to the shaft orientations of a rocker arm 13, respectively, and the interior is equipped with the SIMM

insertion hole 24 with which insertion arrangement of adjustment SIMM 23 is carried out.
[0036]
While the male screw is formed at the shank 18b periphery which has said lockscrew member 18 on the inferior surface of tongue of hexagon head section 18a at one, apical surface 18c of said shank 18b is formed in the shape of a flat side.
[0037]
While flat-surface section 20c to which apical surface 18c of said lockscrew member 18 contacts a field contact condition is formed in the periphery edge of shank 20b which it has in flange-like head 20a at one, said support pin 20 When it inserts in the pin insertion hole 22, 20d of notches which make flat-surface section 20c the standard for performing alignment in the direction of opening of the female screw hole 19 is formed in said flat-surface section 20c of head 20a, and a corresponding periphery marginal location.
[0038]
Said pin insertion hole 22 has made movable slightly said support pin 20 long in the vertical direction which was mostly formed in the elliptical long hole and was inserted in in the vertical direction at the time of lift adjustment.
[0039]
The shape of an owner bottom is formed almost cylindrical, the formation location is located under the coordinated section 17, and said SIMM insertion hole 24 is formed in the location where a lower limit edge is lower than the lower limit edge of said pin insertion hole 22.
[0040]
While said adjustment SIMM 23 is formed in the shape of half-segmented from a lengthwise direction in a cylinder-like pin and top-face 23a is formed in the shape of a flat side, inferior-surface-of-tongue 23b which contacts the lower limit side of the pin insertion hole 22 is formed in the shape of a circular face. Moreover, when it inserts in the SIMM insertion hole 24, circular face 23c the circular inferior surface of tongue of said pin shank 20b changes [c] contact fitting into a field contact condition is formed in the tip side of said top-face 23a.
[0041]
Furthermore, that die length is set up more greatly than the depth of the SIMM insertion hole 24, and this adjustment SIMM 23 is formed so that this side edge projected from this SIMM insertion hole 24 may be grasped and extraction-and-insertion exchange may become easy. In addition, as for this adjustment SIMM 23, two or more things from which the depth of said circular face 23c differs are prepared beforehand.
[0042]
Said controlling mechanism 9 is equipped with the control axis 25 arranged in the upper part location of a driving shaft 3, the control cam 26 which is fixed to the periphery of this control axis 25 by one, and serves as the rocking supporting point of a rocker arm 13, and the actuator outside drawing which carries out the roll control of said control axis 25 as shown in drawing 4 - drawing 7 .
[0043]
Said control axis 25 is supported free [rotation] by the bracket which it has in the upper limit of the bearing outside drawing while it is arranged in the engine cross direction in parallel with the driving shaft 3. On the other hand, said control cam 26 presents the shape of a cylinder, and the axial center location is deflecting only the part of the thick section from the axial center of a control axis 25 by predetermined.
[0044]
Said actuator consists of an electric motor outside drawing fixed to the back end section of the cylinder head 1, and a screw means of communication which transmits the rotation driving force of this electric motor to said control axis 25.
[0045]
Said electric motor is constituted by the DC motor of a proportionality mold, and is driven with the control signal from the controller outside drawing which detects an engine's operational status. This controller feeds back the detecting signal from various kinds of sensors, such as a crank angle sensor which detects an engine rotational frequency, and a potentiometer which

detects the rotation location of the air flow meter which detects an inhalation air content, the coolant temperature sensor which detects an engine's water temperature, and a control axis 25, detects current engine operational status by an operation etc., and is outputting the control signal to said electric motor.

[0046]

Hereafter, an adjustable operation of the amount of valve lifts of this operation gestalt is briefly explained based on drawing 6 and drawing 7 .

[0047]

First, for example, if an electric motor carries out a rotation drive, this running torque is transmitted to a screw means of communication and it rotates by the controller, the specified quantity rotation drive of the control axis 25 will be carried out [in an engine's low rotation region] by this to an one direction. therefore, the control cam 26 shows drawing 6 A and B -- as -- an one direction -- rotating -- an axial center -- the surroundings of the axial center of a control axis 25 -- the same radius -- rotating -- thick section 26a -- above [from a driving shaft 3] -- alienation -- it moves. Thereby, the supporting pivotably pivotably point (support pin 20) of other end 13b of a rocker arm 13 and a link rod 15 moves upward to a driving shaft 3, and, for this reason, a cam-nose section side can pull up each rocking cam 7 compulsorily through a link rod 15.

[0048]

Therefore, although the amount of valve lifts will be transmitted to the rocking cam 7 and a valve lifter 6 through a link rod 15 if the drive cam 5 rotates and end section 13a of a rocker arm 13 is pushed up through the link arm 14, the amount of lifts of inlet valves 2 and 2 becomes sufficiently small.

[0049]

Furthermore, if an electric motor carries out inverse rotation and a screw means of communication is rotated in this direction by the controller when it shifts to an engine quantity rotation field, with this rotation, a control axis 25 will rotate the control cam 26 in the other directions, as shown in drawing 7 A and B, and an axial center will move downward. For this reason, a rocker arm 13 presses the cam-nose section of the rocking cam 7 below through a link rod 15 by other end 13b by the whole moving in the driving shaft 3 direction shortly, and only the specified quantity rotates this rocking cam 7 whole to a counterclockwise rotation.

[0050]

Therefore, the contact location of the cam side over the top face of the valve lifter 6 of the rocking cam 7 moves to a cam-nose section side (lift section side).

For this reason, if the drive cam 5 rotates and end section 13a of a rocker arm 13 is pushed up through the link arm 14 at the time of open actuation of an inlet valve 2, the amount of valve lifts of inlet valves 2 and 2 will become large through a valve lifter 6.

[0051]

Next, the adjustment procedure of the amount of valve lifts of each inlet valves 2 and 2 between each gas column at the time of attachment of each configuration member of a moving valve mechanism is explained.

[0052]

First, although the amount of lifts of each inlet valves 2 and 2 between each gas column at the time of the minimum valve lift is checked after attaching each component part, such as a driving shaft 3, and the transfer device 8, a controlling mechanism 9, through a cam shaft carrier to the cylinder head 1, at this time, end section 15a of a link rod 15 is raised, and it arranges to the coordinated section 17 side of rocker arm other end 13b.

[0053]

And as shown in drawing 2 and drawing 3 , while carrying out insertion arrangement of adjustment SIMM 23 which serves as criteria in said SIMM insertion hole 24 beforehand, shank 20b of the support pin 20 is inserted in the pin holes 15c and 15c of said link rod 15 which intersects perpendicularly with this, and the pin insertion hole 22 of the coordinated section 17, and fitting arrangement of this circular inferior surface of tongue is carried out at circular face 23c of adjustment SIMM 23.

[0054]
Then, said lockscrew member 18 is screwed on the female screw hole 19, and head 18a is bound tight by tools, such as a spanner, contacting flat side 20c of the support pin 20 in apical surface 18c. Said support pin 20 is pressed by this at the adjustment SIMM 23 side, and said adjustment SIMM 23 is held in the pinching condition between the inner skin of the SIMM insertion hole 24, and the support pin 20 by it.
[0055]
When measuring the amount of valve lifts of inlet valves 2 and 2 and having not become a desired lift in this condition, other suitable adjustment SIMM 23 with which thickness width of face differs is chosen, and it reattaches again. That is, loosening the lockscrew member 18, making it move upwards, and lifting the support pin 20 up within the pin insertion hole 22 after that, adjustment SIMM 23 is projected, and an edge is grasped and pulled out.
[0056]
Then, another adjustment SIMM 23 is inserted in in the SIMM insertion hole 24 in this condition, and the lockscrew member 18 is bound tight again and it fixes. For this reason, the support pin 20 will move the inside of the pin insertion hole 22 up and down slightly by the thickness width of face of adjustment SIMM 23, and will be fixed to a predetermined location.
[0057]
Thereby, the vertical die length of a link rod 15 is changed substantially, and is adjusted to homogeneity and the optimal range in the valve lift of the inlet valves 2 and 2 between each gas column.
[0058]
And since this lift tuning can do relaxation / conclusion activity of said lockscrew member 18 from the upper part side of the gravity direction to the female screw hole 19, without taking out and inserting the support pin 20 while taking out and inserting adjustment SIMM 23 from the SIMM insertion hole 24, i.e., an engine's cross direction, the tuning of this amount of valve lifts becomes easy.
[0059]
It becomes possible for the die length of a link rod 15 to be substantially changed by thick modification of adjustment SIMM 23 by this, and to adjust the amount of lifts of each inlet valves 2 and 2 to the optimal desired magnitude by it.
[0060]
Moreover, with this operation gestalt, concave circular face 23c of adjustment SIMM 23 and the support pin 20 can control the rise of the planar pressure between both, even if a load joins adjustment SIMM 23 from the support pin 20, since it is contacted by field contact. Consequently, according to the big load from the support pin 20, the so-called setting phenomenon of the contact section with adjustment SIMM 23 is prevented, and generating of the backlash between both can be prevented.
[0061]
Moreover, since it is not necessary to form concave circular face 23c in this adjustment SIMM 23, and to form a crevice in the peripheral face of the support pin 20 as mentioned above in order to secure the field contact to adjustment SIMM 23, the high reinforcement of this support pin 20 is securable.
[0062]
Furthermore, since both the support pin 20 and adjustment SIMM 23 are fixable, only using the lockscrew member 18, while the immobilization is easy, these desorption activities are also easy.
[0063]
And with this operation gestalt, since a field contact condition can be contacted in flat apical surface 18c of said lockscrew member 18 at flat-surface section 20c of the support pin 20, even if a load joins the lockscrew member 18 from the support pin 20 during actuation, it becomes possible to make planar pressure between both small enough. For this reason, the setting of the contact section of the support pin 20 and the lockscrew member 18 is prevented, and generating of the backlash between both can be controlled.
[0064]

Moreover, even if 18 turns to which direction and a lockscrew member is inserted in the female screw hole 19, it becomes possible to make the flat-surface section of the support pin 20 always carry out field contact of the apical surface 18c.
[0065]
Furthermore, since 20d of notches which make head 20a of said support pin 20 recognize the location of said flat-surface section 20c was formed, when the support pin 20 is inserted in the pin holes 15c and 15c or the pin insertion hole 22, by making 20d of said notches into a standard, flat-surface section 20c can be turned in the direction of opening of the female screw hole 19, and can be positioned. Thereby, it becomes possible to always carry out field contact of apical surface 18c of the lockscrew member 18, and the flat-surface section 20c.
[0066]
In this invention, since the amount of the minimum valve lifts of inlet valves 2 and 2 is made applicable to adjustment according to a lift adjustable device, it becomes possible to decrease gap of the amount of valve lifts as much as possible, and dispersion in the amount of valve lifts between each gas column can fully be prevented.
[0067]
Drawing 8 – drawing 11 show the 2nd operation gestalt, adjustment of the amount of valve lifts is replaced with adjustment SIMM, and a place which that of basic structure is the same as that of the 1st operation gestalt almost, and is different uses it as an adjusting-screw member.
[0068]
That is, the support pin 20 inserted in the pin insertion hole 22 of said coordinated section 17 is mostly formed in the shape of a cylinder, and while the 2 surface-width-like flat-surface sections 20e and 20f are mostly formed in the central site, when [of a vertical side] it inserts in the pin insertion hole 22 in an end side, 20g of slots elliptical [for recognizing a flat-surface sections / 20e and 20f / location from the outside] is formed.
[0069]
Moreover, while penetration formation of the female screw hole 30 for adjustment is carried out inside the lower limit of said coordinated section 17 at said female screw hole 19 and same axle top, the adjusting-screw member 31 thrust into this female screw hole 30 for adjustment from a lower part side is formed.
[0070]
This adjusting-screw member 31 is formed in the shape of flatness so that top-face 31a may contact 20f of flat-surface sections of said support pin 20 bottom by field contact, while presenting the shape of a cylinder mostly and forming the male screw in the peripheral face.
[0071]
Moreover, penetration formation of the 18d of the holes for tool insertion with which the tools 33, such as a wrench long and slender to the internal shaft orientations of said lockscrew member 18, are inserted in a loosely-fitting condition and which are the tool insertion section is carried out in the vertical direction. On the other hand, 20h of each flat-surface sections [of said support pin 20 / 20e and 20f] holes for the 2nd tool insertion which penetration formation is carried out in the center and follow 18d of said holes for tool insertion is prepared mostly.
[0072]
Furthermore, stop section 31b of the flat-surface hexagon with which the point of each of said tool 33 engages is formed in the interior from the top face of said screw-thread adjusting-screw member 31.
[0073]
Therefore, according to this operation gestalt, in order to adjust the amount of the minimum valve lifts of inlet valves 2 and 2, where each configuration member is attached beforehand, respectively, the amount of the minimum valve lifts of inlet valves 2 and 2 is measured.
[0074]
That is, while inserting in the support pin 20 beforehand first in the pin holes 15c and 15c of a link rod 15, and the pin insertion hole 22, the adjusting-screw member 31 is thrust into the female screw hole 30 for adjustment from a lower part to the predetermined depth. Then, the lockscrew member 18 is thrust into the female screw hole 19 for immobilization, and it binds

tight through head 18a with a spanner.
[0075]
Although the amount of valve lifts of inlet valves 2 and 2 is measured at this time, when the amount of the minimum valve lifts has shifted from the reference value, said lockscrew member 18 is temporarily loosened by the tool.
[0076]
Then, point 33a of this wrench tool 33 is inserted into engagement section 31a of the adjusting-screw member 31, inserting the wrench tool 33 from the upper part side of the gravity direction into 18d of each hole for tool insertion of the lockscrew member 18 or a pin 20, and 20h, as shown in drawing 10 , rotation actuation of the wrench tool 33 is carried out, and one of right and left is made to rotate the adjusting-screw member 31.
[0077]
By this, the adjusting-screw member 31 makes it move towards one of the upper and lower sides slightly, and, thereby, moves the location of the support pin 20 up and down within the pin insertion hole 22.
[0078]
Consequently, since the location of the support pin 20 in the longitudinal direction of a link rod 15 is changed and the die length of a link rod 15 is changed substantially, the amount of the minimum valve lifts of inlet valves 2 and 2 can be tuned finely.
[0079]
If the lockscrew member 18 is again bound tight by tools, such as a spanner, after determining the amount of valve lifts, said support pin 20 will be fixed to a pinching condition between this lockscrew member 18 and the adjusting-screw member 31, and the tuning of the amount of valve lifts will be completed by this.
[0080]
Thus, with this operation gestalt, since the amount of valve lifts can be adjusted in the condition [having attached each configuration member not to mention the ability performing tuning of the amount of valve lifts from a gravity upper part side], this tuning becomes still easier.
[0081]
Moreover, since the lockscrew member 18 and the adjusting-screw member 31 contact in the state of field contact to the support pin 20, respectively by the mutual apical surfaces 18c and 31a and the flat-surface sections 20e and 20f, the planar pressure of each of this contact side becomes low. Consequently, according to the big load from the support pin 20 under actuation, the so-called setting phenomenon of each contact section is prevented, and generating of the backlash between both can be prevented.
[0082]
Technical thought other than invention indicated to said claim grasped from said operation gestalt is explained below.
[0083]
Claim (1) Moving valve mechanism of the internal combustion engine according to claim 1 or 2 characterized by carrying out field contact of said support pin and adjustment SIMM of each other.
[0084]
Since both contact by field contact during actuation of equipment even if a load joins adjustment SIMM from a support pin, the rise of planar pressure can be controlled. Consequently, according to the big load from a support pin, the so-called setting phenomenon of the contact section with adjustment SIMM is prevented, and generating of the backlash between both can be prevented.
[0085]
Claim (2) Moving valve mechanism of an internal combustion engine given in the claim (1) characterized by forming the crevice of the shape of radii in alignment with the periphery of said support pin in the peripheral face of said adjustment SIMM.
[0086]
Since it is not necessary to form a crevice in the peripheral face of a support pin in order to secure the field contact to adjustment SIMM, the high reinforcement of this support pin is

securable.
[0087]
Claim (3) Moving valve mechanism of the internal combustion engine according to claim 1 or 2 characterized by pinching said adjustment SIMM between support pins by forming said holddown member by the lockscrew member by which the male screw section was formed in the periphery, and carrying out screwing conclusion of the lockscrew member at said female screw hole while forming said hole for immobilization with the female screw hole formed in said predetermined member.
[0088]
Since both a support pin and adjustment SIMM are fixable, only using a lockscrew member, while the immobilization is easy, these desorption activities are also easy.
[0089]
Claim (4) Moving valve mechanism of an internal combustion engine given in the claim (3) characterized by carrying out field contact of said support pin and lockscrew member.
[0090]
During actuation of equipment, since it becomes possible to make planar pressure between both small enough even if a load joins a lockscrew member from a support pin, the setting of the contact section of a support pin and a lockscrew member is prevented, and generating of the backlash between both can be controlled.
[0091]
Claim (5) Moving valve mechanism of an internal combustion engine given in the claim (3) characterized by forming the apical surface of said lockscrew member evenly while forming the flat-surface section to which the point of said lockscrew member contacts the peripheral face of said support pin.
[0092]
Even if a lockscrew member turns to which direction and is inserted in the hole for immobilization, it becomes possible to make the flat-surface section of a support pin always carry out field contact of the apical surface.
[0093]
Claim (6) Moving valve mechanism of an internal combustion engine given in the claim (5) characterized by forming in the head by the side of the end of said support pin the mark which makes the location of said flat-surface section recognize.
[0094]
Since it can double with the location which turns the flat-surface section to the opening side of the hole for immobilization, positions it by the mark of a head, and intersects perpendicularly with the point of a lockscrew member when a support pin is inserted in the pin hole of said arm section, field contact of said flat-surface section and the apical surface with a flat lockscrew member can always be carried out.
[0095]
Claim (7) Moving valve mechanism of the internal combustion engine according to claim 1 characterized by establishing the lift adjustable device which the rocking location of said rocking cam is changed to the rocking force transfer path of said transfer device, and makes adjustable the amount of valve lifts of an engine valve.
[0096]
In this invention, since the amount of the minimum valve lifts of an engine valve can be made applicable to adjustment according to a lift adjustable device, it becomes possible to decrease gap of the amount of valve lifts as much as possible, and dispersion in the amount of valve lifts between each gas column can fully be prevented.
[0097]
This invention may be good also considering the adjustable device which is not limited to the configuration of said operation gestalt and makes a valve lift adjustable as other structures, and may be the thing of the structure of for example, a raindrop form about a drive cam. Moreover, it is also possible to apply a lift adjustment device to the exhaust valve side or valves [both] side other than an inlet-valve side.

[Brief Description of the Drawings]
[0098]
[Drawing 1] It is the decomposition perspective view of a rocker arm and a lift adjustment device with which the 1st operation gestalt of this invention is presented.
[Drawing 2] It is the side elevation in which carrying out the cross section of a part of rocker arm with which this operation gestalt is presented, and lift adjustment device, and showing them.
[Drawing 3] It is the important section sectional view of this operation gestalt.
[Drawing 4] It is the important section perspective view of the moving valve mechanism in this operation gestalt.
[Drawing 5] It is the important section top view of the moving valve mechanism in this operation gestalt.
[Drawing 6] A shows the open condition of the inlet valve at the time of the minimum valve-lift control in this operation gestalt, and B is the operation explanatory view showing the closed state of an inlet valve.
[Drawing 7] A shows the open condition of the inlet valve at the time of the maximum valve-lift control in this operation gestalt, and B is the operation explanatory view showing the closed state of an inlet valve.
[Drawing 8] It is the decomposition perspective view of a rocker arm and a lift adjustment device with which the 2nd operation gestalt is presented.
[Drawing 9] The rocker arm with which this operation gestalt is presented, a lift adjustment device, and side elevation **** of a link rod.
[Drawing 10] It is the A-A line sectional view of drawing 9 .
[Drawing 11] It is the top view of the rocker arm with which this operation gestalt is presented, a lift adjustment device, and a link rod.
[Description of Notations]
[0099]
2 -- Inlet valve (engine valve)
3 -- Driving shaft
4 -- Cam shaft
5 -- Drive cam
7 -- Rocking cam
8 -- Transfer device
9 -- Controlling mechanism
13 -- Rocker arm
13b -- Other end
15 -- Link rod
15a -- End section
15cand15c -- Pin hole
16 -- Lift adjustment device
17 -- Coordinated section
18 -- Lockscrew member
18c -- Apical surface
19 -- Female screw hole
20 -- Support pin
20c -- Flat-surface section
20 e.20f -- Flat-surface section
18 d.20h -- Hole for tool insertion
22 -- Pin insertion hole
23 -- Adjustment SIMM
23c -- Circular face
25 -- Control axis
26 -- Control cam
30 -- The 2nd female screw hole
31 -- Adjusting-screw member

31a -- Engagement slot

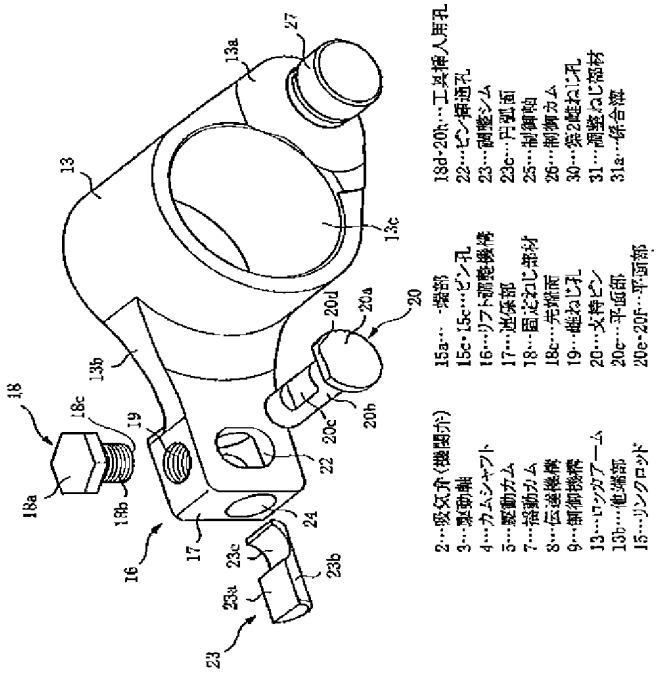
[Translation done.]

* NOTICES *

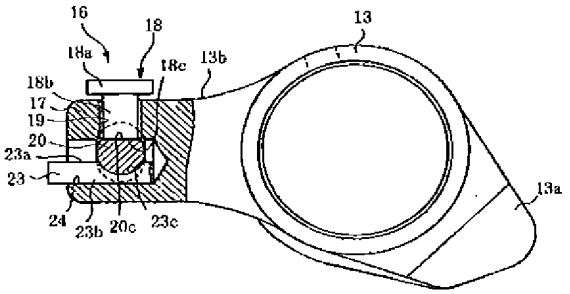
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

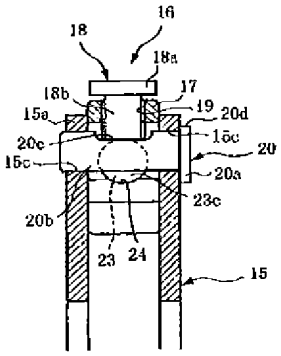
[Drawing 1]



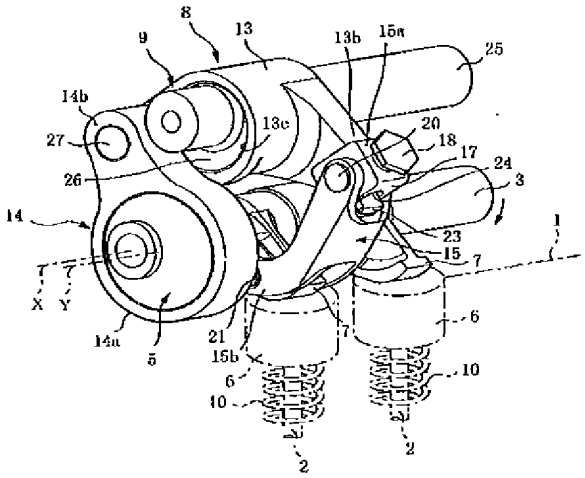
[Drawing 2]



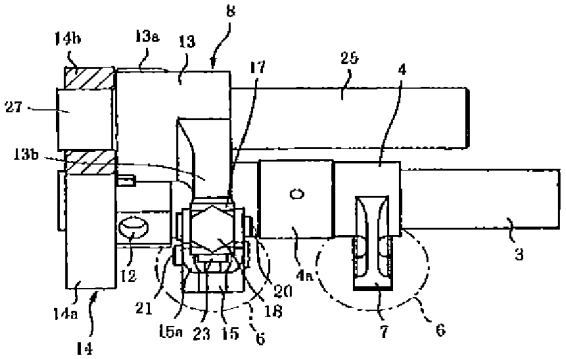
[Drawing 3]



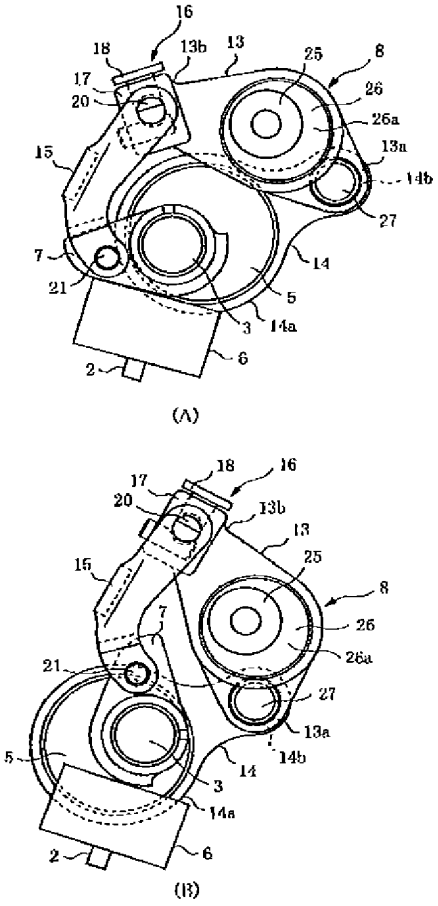
[Drawing 4]



[Drawing 5]



[Drawing 6]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18
13b
13
25
8
17
20
26
26a
15
13a
14b
27
7
14
21
5
3
14a
6
2
(A)
18
16
17
20
13b
13
15
25
8
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26a
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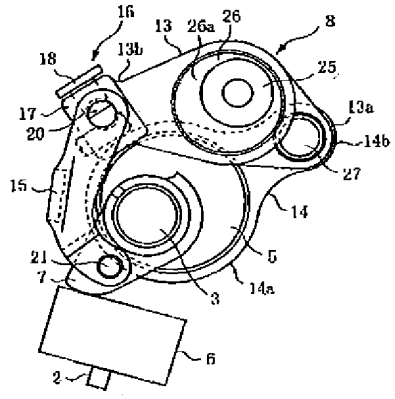
27
13a
5
14b
14
3
14a
2
6
(B)

[Drawing 7]



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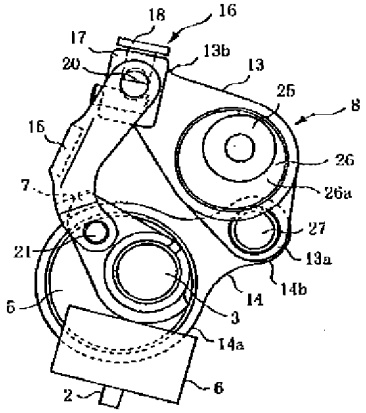
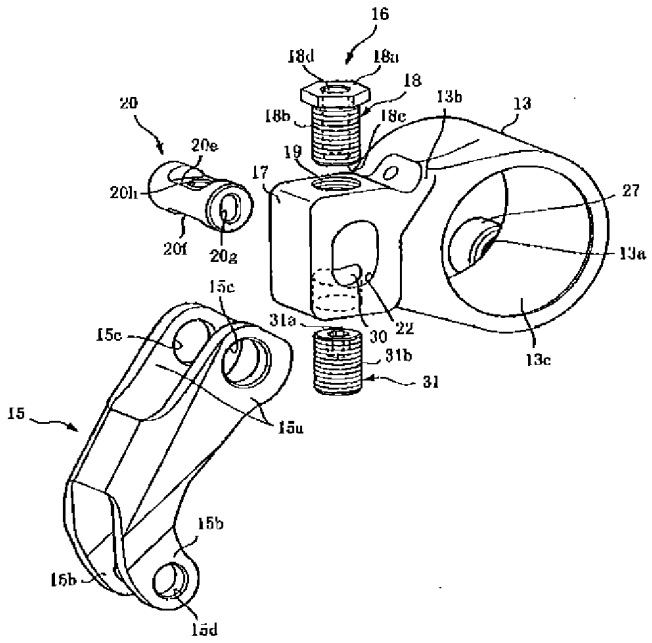
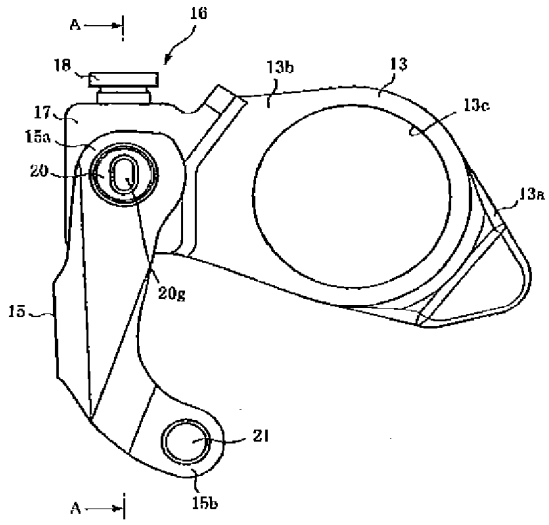


(B)

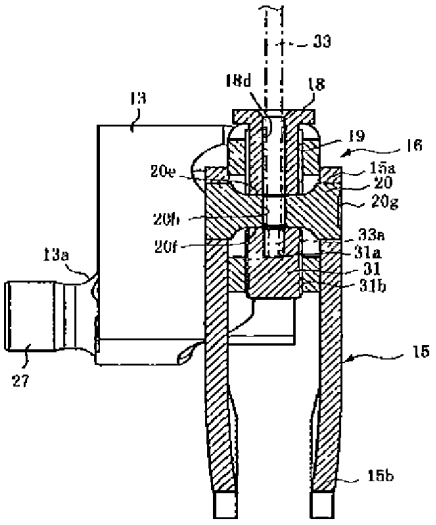
[Drawing 8]



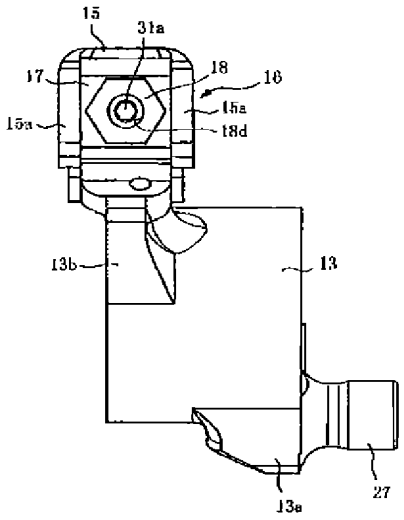
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]